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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/602,172	06/24/2003	Michael B. Korzenski	ATMI-643	9457

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EXAMINER	
WEBB, GREGORY E	

ART UNIT	PAPER NUMBER
1751	

DATE MAILED: 04/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/602,172	KORZENSKI ET AL.	
	Examiner	Art Unit	
	Gregory E. Webb	1751	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 January 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-96* is/are pending in the application.

4a) Of the above claim(s) *49-96* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16 and 18-48* is/are rejected.

7)☒ Claim(s) *17* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *020304,100903*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 1/3/2005 have been fully considered but they are not persuasive. The examiner appreciates the applicant's arguments but maintains that searching the method and composition would require wholly different search strategies. For example instant claim 1 requires only a supercritical fluid and a fluorospecies. The examiner would in this claim search only for these two components. In contrast, instant claim 49 requires that this same composition be used in a semiconductor cleaning process. If the examiner found a reference removing caffeine from coffee using a composition containing supercritical fluid and a fluoro species, the examiner could use this reference for rejecting the composition claims but not the method.

In an effort to speed prosecution of the case, the examiner will upon finding allowable compositions rejoin the applicant's non-elected method claims to those allowable composition claims. In this way the examiner can more directly focus his searching on the compositional aspects of the invention and provide a more direct and targeted search.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 1-16, 18-48 are rejected under 35 U.S.C. 102(b) as being anticipated by Mullee (US6306564).

Concerning the SCCO2, Mullee teaches the following:

> Removal of resist or residue from semiconductors using supercritical carbon dioxide(see title)

Concerning the hydrogen fluoride, ammonium fluoride, preferred cosolvents, preferred alcohols and the most preferred alcohols, Mullee teaches the following:

> Preferred types of chemicals include: N-Methyl Pyrrolidone (NMP), diglycol amine, hydroxyl amine, tertiary amines, catechol, ammonium fluoride, ammonium bifluoride, methylacetoacetamide, ozone, propylene glycol

monoethyl ether acetate, acetylacetone, dibasic esters, ethyl lactate, CHF.sub.3, BF.sub.3, other fluorine containing chemicals, or a mixture of any of the above chemicals. Optionally, one or more of these chemicals or mixture of chemicals may be introduced into system as described above from the same or a different solvent chamber(s) 44 and 46. Other chemicals such as an organic solvent may be used independently or added to one or more of the above chemicals to remove organic contaminants from the wafer surface. The organic solvent may include, for example, an alcohol, ether, and/or glycol, such as acetone, diacetone alcohol, dimethyl sulfoxide (DMSO), ethylene glycol, methanol, ethanol, propanol, or isopropanol (IPA). Although conventionally large amounts of chemicals can be used, applicant prefers to introduce each of these chemicals or mixtures of chemicals in an amount that is less than about 15% v.sub.c /v.sub.v and preferably from 0.1 to 15% v.sub.c /v.sub.v, where v.sub.c is the liquid volume of the chemical and v.sub.v is the volume of pressure vessel 40. Preferably less than a few milliliters of chemicals are employed for each resist removal step 130; however, larger amounts can be used.(see col. 4, lines 12-36)

Concerning the most preferred cosolvent, Mullee teaches the following:

29. The method of claim 28 wherein a ratio of the n-methyl pyrrolidone to the combination of the supercritical carbon dioxide and the n-methyl pyrrolidone is between 0.1 and 15% by volume.(see claim 29)

Concerning the claimed pressure range, Mullee teaches the following:

To accomplish pressure vessel purging step 110, valves 88, 84, 78, 82, 74, and 70 are preferentially sequentially closed. The system pressure is then preferably adjusted to between 1,000 and 2,000 psig, and preferably between 1,000 and 1,500 psig by controlling the pumping rate at pressure regulating valve 61 and by adjusting the back pressure regulator 112. Back pressure regulator 112 is positioned between pressure vessel 40 and exhaust 100 and allows line 113 to be depressurized to ambient atmospheric pressure. The CO.sub.2 system flow is also preferably set to between 0.5 and 20 liters per minute (LPM), and more preferably between 3 to 6 LPM.(see col. 3, lines 42-53)

Concerning the claimed temperature range, Mullee teaches the following:

FIG. 2 is a schematic diagram of a simplified resist removal system 30 of the present invention, and FIG. 3 is a flow diagram of a simplified resist removal process 32 according to the present invention. With reference to FIGS. 2 and 3, resist removal process 32 is preferably initiated by activating heat exchanger 34 to reduce the temperature of coolant flowing through cold trap 36. Then, system preheating step 38 brings pressure vessel 40, including wafer chamber 42, and solvent chambers 44 and 46 to a preferred operating temperature of 45 to 65.degree. C. prior to the arrival of wafer 10. Skilled persons will appreciate that pressure vessel 40 may alternatively be maintained at a preferred processing temperature to facilitate throughput, or the temperature may be gradually increased

from ambient temperature after wafer 10 enters pressure vessel 40 to reduce stress on wafer 10 or semiconductor devices or features 22 fabricated on wafer 10. Although electrical resistance heaters are preferably built into the walls of vessel 40 and chambers 44 and 46 to perform heating step 38, skilled persons will appreciate that other conventionally available heating techniques could be employed. Skilled persons will also appreciate that electrical resistance tape may be wrapped around all or some of the connecting lines, such as line 43 between pump 92 and vessel 40 and lines 45 and 47 between respective chambers 44 and 46 and line 43, to maintain the temperature of parts of system 30 at or near the temperature of vessel 40 and chambers 44 and 46.(see col. 2, lines 50-68)

Claims 1-16, 18-48 are rejected under 35 U.S.C. 102(b) as being anticipated by Castrucci (US6521466).

Concerning the SCCO2 and the claimed surfactant, Castrucci teaches the following:

At temperatures above 31.degree. C. and pressure of 1072 psi, the liquid and gaseous phases of CO.sub.2 combine to form supercritical CO.sub.2 (SCCO2). Supercritical fluid possesses liquid-like solution and gas-like diffusion properties. SCCO2 has low viscosity and low dielectric constant. The low viscosity of SCCO2 enables rapid penetration into crevices, pores, trenches and vias with complete removal of both organic and inorganic

contaminants. Organic contaminants that can be removed with SCCO2 include oils, grease, organic films, photoresist, plasticizers, monomers, lubricants, adhesives, fluorinated oils and surfactants. Inorganic contaminants that can be removed with SCCO2 include metals, metal complexing agents, inorganic particulates. Contaminants solvate within the SCCO2 and are evacuated into a low pressure chamber, where they become insoluble and are precipitated from the liquid CO.sub.2. The supercritical fluid technology cleaning tool SCF-CT apparatus has a small footprint of about 75 square feet and sells for about $500K to $1M. Conventional water clean benches cost over $2M. The process of cleaning semiconductor surfaces using SCCO2 is described in a technical paper entitled "Precision Cleaning of Semiconductor Surfaces Using Carbon Dioxide Based Fluids" by J. B. Rubin, L. D. Sivils, and A. A. Busnaina published in Proceedings SEMICON WEST 99, Symposium On Contamination Free Manufacturing for Semiconductor Processing, San Francisco, Calif. Jul. 12-14, 1999, the entire content of which is expressly incorporate herein by reference.(see col. 2, lines 40-68)

Concerning the hydrogen fluoride, preferred cosolvents, preferred alcohols, most preferred alcohols and the primary-secondary amines, Castrucci teaches the following:

27. The method of claim 26 wherein said defect specific co-solvent is selected from the group consisting of methanol, isopropyl alcohol and other related alcohols, butylene carbonate, propylene carbonate and related carbonates, ethylene glycol and related glycols, ozone, hydrogen

fluoride and related fluorides, ammonium hydroxide and related hydroxides, citric acid and related acids and mixtures thereof.(see claim 27)

Concerning the claimed pressure range and the claimed temperature range, Castrucci teaches the following:

24. The method of claim 23 wherein said supercritical fluid is carbon dioxide and said temperature and pressure range from 20 to 70.degree. C. and 1050 to 10000 psi, respectively.(see claim 24)

Claims 1-16, 18-48 are rejected under 35 U.S.C. 102(b) as being anticipated by Mullee (US6871656).

Concerning the SCCO2 and the supercritical fluid, Mullee teaches the following:

Solvency of the supercritical carbon dioxide increases with pressure. The supercritical carbon dioxide effectively carries a small amount of the stripper chemical onto sub-micron surface features of modern semiconductor devices because diffusivity and viscosity of the supercritical carbon dioxide is similar to a gas phase and because density of the supercritical carbon dioxide is nearly equal to a liquid phase. The supercritical carbon dioxide also carries away the photoresist, or the photoresist residue, and remaining stripper chemical from the surface of the wafer. Thus, it is possible to use the small amount of the stripper chemical to perform the stripping process and to also carry away remaining chemicals and residue.(see col. 2, lines 55-68)

Concerning the hydrogen fluoride, ammonium fluoride, preferred cosolvents and the preferred alcohols, Mullee teaches the following:

> Preferred types of chemicals include: N-Methyl Pyrrolidone (NMP), diglycol amine, hydroxyl amine, tertiary amines, catechol, ammonium fluoride, ammonium bifluoride, methylacetoacetamide, ozone, propylene glycol monoethyl ether acetate, acetylacetone, dibasic esters, ethyl lactate, CHF.sub.3, BF.sub.3, other fluorine containing chemicals, or a mixture of any of the above chemicals. Optionally, one or more of these chemicals or a mixture of these chemicals may be introduced into the system 101 as described above from the same or a different solvent chamber(s) 44 and 46. Other chemicals such as an organic solvent may be used independently or added to one or more of the above chemicals to remove organic contaminants from the wafer surface. The organic solvent may include, for example, an alcohol, ether, and/or glycol, such as acetone, diacetone alcohol, dimethyl sulfoxide (DMSO), ethylene glycol, methanol, ethanol, propanol, or isopropanol (IPA). Although conventionally large amounts of chemicals can be used, the applicant prefers to introduce each of these chemicals or mixtures of chemicals in an amount that is less than 15% v.sub.c /v.sub.v, and preferably from 0.1 to 15% v.sub.c /v.sub.v, where v.sub.c is the liquid volume of the chemical and v.sub.v is the volume of the pressure vessel 40. Preferably less than a few millimeters of chemicals are employed for each resist removal step, but larger amounts can be used.(see col. 5, lines 33-58)

Concerning the most preferred cosolvent, Mullee teaches the following:

> 5. The apparatus of claim 4 wherein the at least one solvent chamber is configured to hold a material selected from the group consisting of N-methyl pyrrolidone, di-isoppropyl amine, tri-isopropyl amine, diglycol amine, and a mixture thereof.(see claim 5)

Concerning the most preferred alcohols, Mullee teaches the following:

> When desired process conditions are reached, the small amount of the stripper chemical is introduced into a supercritical carbon dioxide stream and thus added into the pressure chamber in a third process step 24. A volume ratio of the stripper chemical to the supercritical carbon dioxide is preferably 0.1 to 15.0 v/v %. The stripper chemical is preferably selected from the group consisting of N-methyl pyrrolidone, monoethanol amine, di-isopropyl amine, tri-isopropyl amine, diglycol amine, hydroxyl amine, catechol, and a mixture thereof. Monoethanol amine, hydroxyl amine, and catechol have only marginal utility.(see col. 3, lines 10-20)

Concerning the claimed pressure range, Mullee teaches the following:

> To purge the pressure vessel 40, the valves 88, 84, 78, 82, 74, and 70 are preferentially sequentially closed. The system pressure is then preferably adjusted between 1,000 and 2,000 psig, preferably between 1,000 and 1,500 psig, by controlling the pumping rate at the pressure regulating valve 61 and by adjusting the back pressure regulator 112. The back pressure regulator 112 is positioned between the pressure vessel 40 and the exhaust

100 and allows the line 113 to be depressurized to ambient atmospheric pressure. The CO.sub.2 system flow is also preferably set to between 0.5 and 20 liters per minute (LPM), and more preferably between 3 and 6 LPM.(see col. 4)

Concerning the claimed temperature range, Mullee teaches the following:

In the removal system 101, a removal process is preferably initiated by activating the heat exchanger 34 to reduce the temperature of coolant flowing through the cold trap 36. Then, a system pre-heating step brings the pressure vessel 40, including the wafer chamber 42 and the solvent chambers 44 and 46, to a preferred operating temperature of between 45 and 65.degree. C. before a wafer (not shown) is inserted into the pressure vessel 40. Those skilled in the art will appreciate that the pressure vessel 40 may alternatively be maintained at a preferred processing temperature to facilitate throughput, or the temperature may be gradually increased from ambient temperature after the wafer is inserted into the pressure vessel 40. In this way, stress is reduced on the wafer, on features fabricated on the wafer, or on semiconductor devices other than wafers. Although electrical resistance heaters are preferably built into the walls of the pressure vessel 40 and the solvent chambers 44 and 46 to heat them, those skilled in the art will appreciate that other conventionally available heating techniques can be used. Those skilled in the art will also appreciate that electrical resistance tape may be wrapped around all or some of the connecting lines, such as the line 43

between the pump 92 and the pressure vessel 40, and the lines 45 and 47 between the chambers 44 and 46, respectively, and the line 43. The tape can be used to maintain the temperature of parts of system 101 at or near the temperature of the pressure vessel 40 and the chambers 44 and 46.(see cols. 3-4)

Claims 1-16, 18-48 are rejected under 35 U.S.C. 102(b) as being anticipated by DeSimone (US5944996).

Concerning the SCCO2 and the supercritical, DeSimone teaches the following:

2. A process according to claim 1, wherein said fluid comprises supercritical carbon dioxide.(see claim 2)

Concerning the hydrogen fluoride, DeSimone teaches the following:

In addition to the steps for separating the contaminant described above, additional steps may be employed in the present invention. For example, prior to contacting the substrate with the CO.sub.2 fluid, the substrate may be contacted with a solvent to facilitate subsequent removal of the contaminant from the substrate. The selection of the solvent to be used in this step often depends on the nature of the contaminant. As an illustration, a hydrogen fluoride or hydrogen fluoride mixture has been found to facilitate the removal of polymeric material, such as poly(isobutylene) films. Exemplary solvents for this purpose are described in U.S. Pat. No. 5,377,705 to Smith, Jr. et al., the contents of which are incorporated herein by reference.(see col. 6, lines 7-19)

Concerning the preferred cosolvents and the most preferred cosolvent, DeSimone teaches the following:

> The system described in Example 1 is used to clean a machine tool with poly(1,1'-dihydroperfluorooctyl acrylate-co-vinyl pyrrolidone) random copolymer. A machine tool of this type is typically used in the production of metal parts such as an end mill. A contaminant removed from the machine tool is cutting oil.(par#175)

Concerning the preferred alcohols and the most preferred alcohols, DeSimone teaches the following:

> The system described in Example 1 is cleaned in which a methanol cosolvent is employed in the CO.sub.2 phase.(see example 19)

Concerning the claimed surfactant, DeSimone teaches the following:

> A co-surfactant may be used in the CO.sub.2 phase in addition to the amphiphilic species. In general, co-surfactants are those compounds which may not be surface active, but that modify the action of the amphiphilic species. Suitable co-surfactants for the invention are well known by those skilled in the art.(see col. 4, lines 13-18)

Concerning the claimed pressure range and temperature range, DeSimone teaches the following:

> A PDMS exthoxylate amphiphilic species is present in neat CO.sub.2 below 1,200 psia at ambient temperature. Upon the addition of 0.5 percent of isopropyl alcohol, the system appears clear in that one liquid phase is present at 1,100 psia which exhibits detergency toward water soluble stain

on cotton cloth.(see example 21)

Claims 1-16, 18-48 are rejected under 35 U.S.C. 102(b) as being anticipated by McClain (US6743078).

Concerning the SCCO2 and the supercritical, McClain teaches the following:

"Supercritical carbon dioxide" refers to dense carbon dioxide at conditions above the critical T and critical P.(see col. 4, lines 55-57)

Concerning the hydrogen fluoride, McClain teaches the following:

(C) Fluorides, such as potassium fluoride, hydrogen fluoride, etc.(see col. 7, lines 40-42)

Concerning the preferred cosolvents, McClain teaches the following:

Additional cosolvents include DMSO, mineral oil, terpenes such as limonene, vegetable and/or plant oils such as soy or corn oil, derivatives of vegetable oils such as methyl soyate, NMP, halogenated alkanes (e.g., hydrochlorofluorocarbons, perfluorocarbons, brominated alkanes, and chlorofluorocarbons) and alkenes, alcohols, ketones and ethers. The cosolvent may be a biodegradable cosolvent such as ARIVASOL.TM. carrier fluid (available from Uniqema, Wilmington, Del. USA, a subsidiary of ICI). Mixtures of the above co-solvents may be used.(see col. 8, lines 45-63)

Concerning the preferred alcohols, McClain teaches the following:

Slurries used herein may be aqueous or nonaqueous (water-free). Slurries that are predominantly CO.sub.2 slurries (with or without other

cosolvents) may contain some water to participate in the chemical component of the CMP, such as softening of oxide surfaces. Thus the slurry may comprise from 0, 0.01, 0.1 or 1 to 2, 5, 10 or 20 percent by weight water or more, depending upon the particular application of the slurry.(see col. 8, lines 55-63)

Concerning the most preferred alcohols, McClain teaches the following:

Cosolvents. The CMP polishing slurry may optionally contain one or more cosolvents. Cosolvents that may be used in conjunction with the carbon dioxide solvent include both polar and non-polar, protic and aprotic solvents, such as water and organic co-solvents. The organic co-solvent is, in general, a hydrocarbon co-solvent. Typically the co-solvent is an alkane, alcohol or ether-co-solvent, with C.sub.10 to C.sub.20 linear, branched, and cyclic alkanes, alcohols or ethers, and mixtures thereof (preferably saturated) currently preferred. The organic co-solvent may be a mixture of compounds, such as mixtures of alkanes as given above, or mixtures of one or more alkanes. Additional compounds such as one or more alcohols (e.g., from 0 or 0.1 to 5% of a C1 to C15 alcohol such as isopropyl alcohol (including diols, triols, etc.)) different from the organic co-solvent may be included with the organic co-solvent.(see col. 8, lines 8-23)

Concerning the boric acid, McClain teaches the following:

(D) Inorganic or organic per-compounds, (i.e., compounds containing at least one peroxy group (--O--O--) or a compound containing an element in its highest oxidation state, such as hydrogen peroxide (H.sub.2 O.sub.2)

and its adducts such as urea hydrogen peroxide and percarbonates, organic peroxides such as benzoyl peroxide, peracetic acid, di-t-butyl peroxide, monopersulfates, dipersulfates, and sodium peroxide. Examples of compounds containing an element in its highest oxidation state include but are not limited to periodic acid, periodate salts, perbromic acid, perbromate salts, perchloric acid, perchloric salts, perboric acid, and perborate salts and permanganates. Examples of non-per compounds that meet the electrochemical potential requirements include but are not limited to bromates, chlorates, chromates, iodates, iodic acid, and cerium (IV) compounds such as ammonium cerium nitrate. See, e.g. U.S. Pat. No. 6,068,787 to Grumbine et al.(see col. 7, lines 43-58)

Concerning the claimed surfactant, McClain teaches the following:

Surfactants. Surfactants that may be used in the present invention include those that contain a CO.sub.2 -philic group (particularly for a carrier or wash that comprises CO.sub.2), and/or those that do not contain a CO.sub.2 -philic group (e.g., when the carrier or wash contains a co-solvent, or does not contain CO.sub.2). Examples are given in U.S. Pat. No. 5,858,022 to Romack et al. Surfactants that contain a CO.sub.2 -philic group may comprise that group covalently coupled to a hydrophilic group, a lipophilic group, or both a hydrophilic group and a lipophilic group. Surfactants may be employed individually or in combination. In general, the amount of surfactant or surfactants included in a composition

(planarizing or wash) is from about 0.01, 0.1 or 1 percent by weight up to about 5, 10 or 20 percent by weight.(see cols. 9-10)

Concerning the claimed pressure range, McClain teaches the following:

Preferably, in the methods and apparatus described below utilizing a CO.sub.2 atmosphere during the CMP step, the transfer device 22 and the pressure controller 43 maintain the vessel at a pressure greater than atmospheric pressure. More preferably, the transfer device 22 and the pressure controller 43 maintain the vessel at a pressure of between about 10 and 10,000 psig. Preferably, the interior of the vessel is maintained at a temperature of between about -53.degree. C. and 30.degree. C.(see col. 14, lines 1-10)

Concerning the claimed temperature range, McClain teaches the following:

"Dense carbon dioxide" is a fluid comprising carbon dioxide at temperature and pressure conditions such that the density is above the critical density (typically the maximum pressure will be less than 1,000 bar and the maximum temperature will be less than 250.degree. C.).(see col. 4, lines 39-44)

Concerning the primary-secondary amines, McClain teaches the following:

(B) Bases, typically hydroxides such as ammonium hydroxide, potassium hydroxide and sodium hydroxide (bases are less preferred when carbon dioxide is a major ingredient in the slurry due to acid-base interactions and reactions).(see col. col. 7, lines 35-40)

Allowable Subject Matter

Claim 17 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Although the prior art teaches the inclusion of perboric acid, the prior art fails to teach the specific use of the boric acid. The prior art provides no motivation for substituting boric acid for the perboric acid as the prior art uses the perboric acid as an oxidizing agent whereas the boric acid does not meet this limitation.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregory E. Webb whose telephone number is 571-272-1325. The examiner can normally be reached on 9:00-17:30 (m-f).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yogendra Gupta can be reached on 571-272-1316. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Gregory E. Webb

Primary Examiner
Art Unit 1751

gew